

SECTION 31 23 19

DEWATERING

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Detection of movement
- B. Dewatering
- C. Records
- D. Restoration

1.02 RELATED SECTIONS

- A. Coordinate the work of this Section with the work of Section 31 40 00, Shoring and Underpinning, and Section 31 50 00, Excavation Support and Protection.

1.03 MEASUREMENT AND PAYMENT

- A. General: Dewatering will not be measured separately for payment, and all costs in connection therewith will be considered incidental to the excavation to which the dewatering work pertains.

1.04 DESCRIPTION

- A. Controlling and disposal of storm water runoff; lowering the water table and intercepting seepage which would otherwise emerge from the slopes or bottoms of excavations; increasing the stability of excavated slopes; preventing loss of material from beneath the slopes or bottoms of excavations; reducing lateral loads on sheeting and bracing; improving the excavating and hauling characteristics of sandy soil; preventing rupture or heaving of the bottom of an excavation; disposal of pumped water; and protection and restoration of adjacent structures, including repair of any settlement-related damage.
- B. Constructing, maintaining, observing, and removing equipment and instrumentation when no longer needed.

1.05 DESIGN CRITERIA

- A. The Contractor shall be responsible for the design and adequacy of the dewatering system. Design the dewatering systems to perform as follows:
 - 1. Effectively reduce the hydrostatic pressure and lower the groundwater levels below the excavation;

2. Develop a substantially dry and stable sub grade for prosecution of construction operations;
3. Prevent damage to adjacent properties, buildings, structures, utilities, and other work as a result of settlement or other groundwater-related effects; and
4. Assure that, after 12 hours of initial pumping, no soil particles will be present in the discharge.

1.06 PERMITS

- A. The Contractor shall obtain all special permits and licensing for dewatering and disposal of pumped water as required to construct and complete the Work.

1.07 SUBMITTALS

- A. Refer to Section 01 33 00, Submittal Procedures, and Section 01 33 23, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.
- B. Submit pre-construction surveys, as specified in Article entitled "Site Conditions" herein.
- C. Submit procedures for detection of movement, as specified in Article entitled "Detection of Movement" herein.
- D. Prior to installation of the dewatering system, submit Shop Drawings and design data, indicating the following:
 1. The proposed type of dewatering system;
 2. Arrangement, location, and depths of system components showing new and existing facilities and utilities;
 3. Complete description of equipment and instrumentation to be used, with installation, operation, and maintenance procedures;
 4. Types and sizes of filters;
 5. Design calculations demonstrating adequacy of the proposed system and equipment. The Contractor shall perform site-specific field testing to determine soil permeabilities to be used for design of the dewatering system;
 6. Estimated discharge rates: and
 7. Methods and locations of disposal of pumped water.
- E. Submit copies of the special permits required for performing the work of this Section.
- F. Submit records as required by Article entitled "Records" herein.

1.08 REGULATORY REQUIREMENTS

- A. Comply with the California Code of Regulations, Title 8, Chapter 4, Subchapter 4 — Construction Safety Orders
- B. Methods of groundwater discharge, conveying, and transmission to off-site locations shall meet with the approval of the governmental authorities having jurisdiction.

1.09 SITE CONDITIONS

- A. Pre-construction Surveys: The Contractor shall submit to the Engineer, for review and approval, pre-construction surveys for existing structures and facilities located above or adjacent to the new construction and which may be affected by the work. These surveys shall include photographs, maps, plans, written descriptions, and surveyed foundation levels as necessary to fully document pre-construction conditions.
- B. Surface Drainage: Intercept and divert precipitation and surface water away from excavations through the use of dikes, curb walls, ditches, pipes, sumps, or other means.
- C. Drainage of Excavated Areas:
 - 1. Provide and maintain ditches of adequate size to collect surface and seepage water which may enter the excavations. Divert the water into sumps and drain or pump into drainage channels or storm drains or sewers, subject to the approval of jurisdictional authorities.
 - 2. When water is to be diverted into a storm drain, provide settling basins or other approved facilities as required to reduce the amount of fine particles which may be carried into the drain. If a storm drain becomes blocked or its capacity restricted due to dewatering operations, make arrangements with the jurisdictional authority, and clean the drain.

PART 2 – PRODUCTS**2.01 MATERIALS AND EQUIPMENT**

- A. The Contractor shall furnish all materials, tools, equipment, facilities, and services as required for providing the necessary dewatering work and facilities. Provide back-up equipment as necessary for replacement and for unanticipated emergencies.
- B. Provide piezometers for monitoring groundwater levels and other instruments and measuring devices as required.

PART 3 – EXECUTION

3.01 DETECTION OF MOVEMENT

- A. For each existing structure that may be affected by the work, install settlement markers on each footing, building corners, wall or surrounding structures to be monitored. Settlement markers shall be capable of being read to an accuracy of 0.005 foot.
- B. Take and record readings not less than once per week during performance of the dewatering work until the permanent structure is complete to the ground level.
- C. Stop work; notify the Engineer, and take immediate remedial action if movement of the existing structure occurs during performance of the work.
- D. Upon completion of the dewatering work, take weekly readings of the measurement points for a period of 4 weeks, or longer if movement persists, and report the results to the Engineer.
- E. The detection of movement shall be performed by a qualified licensed civil engineer or land surveyor.

3.02 DEWATERING

- A. Perform dewatering in accordance with approved Shop Drawings. Keep the Engineer advised of any changes made to accommodate field conditions and, on completion of the dewatering system installation, revise and resubmit Shop Drawings as necessary to indicate the installed configuration.
- B. Organize dewatering operations to lower the groundwater level in excavations as required for prosecution of the work, and to provide a stable, dry sub grade for the prosecution of construction operations. Prior to placement of concrete, the sub grade shall be in a firm, well-drained condition, and of adequate and uniform load-bearing nature to support construction personnel, construction materials, construction equipment, and steel reinforcing mats without tracking, rutting, heaving, or settlement. All weak, soft, saturated, or otherwise unsuitable material shall be removed and replaced with approved backfill.
- C. Maintain water level at lower elevations, so that no damage to structures can occur because of buildup of excessive hydrostatic pressure, and provide for maintaining the water level a minimum of 2 feet below the sub grade.
- D. Additional temporary lowering of the water table may be required to provide suitable soil conditions for the preparation of sub grades for footings and foundations. This may be accomplished by increased pumping from wells, installation of trench drains and sumps, or other appropriate methods.
- E. The extent of dewatering may be reduced for structures designed to withstand hydrostatic uplift pressure, provided such water level does not result in uplift pressures in excess of 80 percent of the downward pressure produced by the weight of the structure and backfill in place. The extent of de-watering will be determined by the Contractor based on piezometer readings.

- F. Maintain groundwater level a minimum of 2 feet below the prevailing level of backfill being placed.
- G. The extent of dewatering for structures with a perforated undertrack drainage system may be reduced in the same manner as for units designed to withstand hydrostatic uplift pressure, provided means of draining the affected portion of the main track drainage systems, including adequate standby equipment, are furnished, installed, and removed, as required.
- H. Methods of dewatering may include sump pumping, single or multiple stage well point systems, eductor and ejector type systems, deep wells, and combination thereof.
- I. Locate dewatering facilities where they will not interfere with utilities and construction work to be performed by others.
- J. Modify dewatering procedures that cause, or threaten to cause, excessive ground movement or damage to new or existing facilities, so as to prevent further ground movement damage.
- K. Wherever possible groundwater shall be discharged into a nearby, existing storm sewerage or drainage system.

3.03 RECORDS

- A. Observe and record the average flow rate and time of operation of each pump used in the dewatering system. Where necessary, provide appropriate devices, such as flow meters, for observing the flow rates. Submit flow-rate data during the period that the dewatering system is in operation.
- B. Observe and record the elevation of the groundwater during the period that the dewatering system is in operation. Submit observation records within 24 hours of reading, on a regular basis.
- C. During initial period of dewatering, make required observations on a daily basis. If, after a period, dewatering operations have stabilized, reduce observations to longer intervals as appropriate.
- D. Submit water quality test results on a periodic basis as required by the jurisdictional authority.

3.04 RESTORATION

- A. Restore existing structures to conditions equivalent to those existing prior to the start of work, including repair of any settlement-related damage.
- B. Remove all equipment and instrumentation used for dewatering.

END OF SECTION 31 23 19